

**Pteridophyta**

- Pteridophytes are chlorophyllous, autotrophic, archegoniate, embryophytic, tracheophytic cryptogams which exhibit diplo-haplontic life cycle.
- They are the first true land plants in the evolution of plant kingdom.
- Diploid sporophyte is the dominant phase in the life cycle which is differentiated into true roots (adventitious) stem and leaves. Leaves may be micro or macro leaves (fronds)
- Vegetative parts of sporophytes possess vascular system hence they are first tracheophytes in the evolution of plant kingdom. They are only vascular cryptogams.
- Meiospores are produced in sporangia, which are born on ventral surface or in the axils of sporophyll (fertile leaves): They may be homosporous or heterosporous.
- Development of sporangium may be leptosporangiate or eusporangiate.  
Leptosporangiate type : - Sporangium develops from a single superficial initial.  
Eusporangiate type : - The sporangium originates from a group of superficial initials.
- Spore germinates to produce haploid gametophyte called prothallus.
- Gametophyte performs sexual reproduction by zooidogamous type of oogamy for which water is necessary.
- Sex organs are multicellular with a sterile jacket without stalk.
- After the fertilization process which takes place in the venter of archegonium, zygote develops into embryo which grows into sporophyte.

**Phanerogamae**

- Phanerogams are **seed producing tracheophytes**.
- Phanerogams produce cones or flowers for reproduction.
- They show heteromorphic alternation of generation
- Reduced gametophyte is totally dependent on dominant sporophyte.
- Multicellular seed is formed with an embryo.
- Plants (sporophytes) are well organised with complex vascular tissues.
- Water is not needed for sexual reproduction
- **Spermatophyta** is the only division in the sub kingdom- phanerogamae.
- Spermatophytes are seed plants with or without fruits.
- Spermatophyta is classified into two sub-divisions - Gymnospermae and Angiospermae.

**Gymnosperms**

- Gymnosperms are phanerogams or spermatophytes without ovary, fruit and without fruit wall. Their seeds are naked
- Gymnosperms are perennial, xerophytic, evergreen woody plants
- The plant is sporophyte with well developed tap root system, woody stem and macrophyllous leaves.
- These plants have vascular tissue in which vessels are absent in xylem and companion cells are absent in phloem.
- They have heterosporous sporophylls which are aggregated to form strobili or cones.
- Microsporangium produces microspores or pollen grains. Pollination is direct and anemophilous (wind pollination)
- Ovules are orthotropous and remain exposed on the megasporophyll. Female gametophyte formed from haploid megaspore is called endosperm. It is a haploid and pre-fertilization product. It produces archegonia and also gives nourishment to embryo.
- Sexual reproduction is siphonogamous type of oogamy. Diploid zygote develops into an embryo while still enclosed within the ovule.

**Angiospermae**

- These are the seed plants with ovaries and fruits
- They are herbaceous, woody and grow in every habitat
- Angiosperms produce flower with perianth
- Megasporophyll (carpel) is differentiated into ovary, style and stigma.
- Ovules are produced inside the ovary.
- Microsporophyll (stamen) produce 2 or 4 microsporangia that produce pollen grains.
- **Pollination is indirect and zoophilous or anemophilous or hydrophilous**
- Female gametophyte (embryosac) contains a single egg cell
- **Siphonogamous type of oogamy takes place in the embryosac**
- **Double fertilization** is the characteristic feature of angiosperms
- Syngamy results in the formation of zygote and triple fusion results in the formation of primary endosperm nucleus (PEN)
- **Endosperm is triploid** and a post fertilization product
- Ovary develops into fruit after fertilization and ovules into seeds
- Seeds contain embryo with one or two cotyledons

## EXERCISE

## LEVEL - I

1. Cryptogams include
  - 1) All flowering plants    2) All non-flowering plants
  - 3) Flowering and non-flowering plants
  - 4) Gymnosperms
2. Which of the following are primitive plants, in which flowers and seeds are not produced
  - 1) Gymnosperms                  2) Dicotyledons
  - 3) Monocotyledons              4) Cryptogams
3. The whole adult cell is the reproductive unit in
  - 1) Algae                              2) Fungus
  - 3) Bryophyta                        4) Unicellular thallophytes
4. Most primitive cryptogams are
  - 1) Bryophyta                        2) Algae
  - 3) Pteridophyta                    4) Dicots
5. A composite organism is
  - 1) Algae    2) Bryophyte    3) Lichen    4) Fungus
6. Characteristic feature of Thallophyta alone is
  - 1) Thalloid plant body
  - 2) Absence of vascular tissues
  - 3) Presence of unicellular gametangia
  - 4) Autotrophic nature
7. Identify the character that can be used to distinguish Thallophyta from other divisions of plant kingdom
  - 1) Presence of cellulose cell wall
  - 2) Reserve food material is usually starch
  - 3) Absence of embryo
  - 4) Absence of vascular tissues
8. Chlorophyllous, photosynthetic and usually aquatic Cryptogams are
  - 1) Algae    2) Fungi    3) Bryophytes    4) Pteridophytes
9. The division in which the unicellular, eukaryotic organisms are included
  - 1) Thallophyta                      2) Bryophyta
  - 3) Pteridophyta                      4) Spermatophyta
10. An alga is
  - 1) Thalloid body of green colour
  - 2) Moss like body with small stem and simple leaves
  - 3) Plant body differentiated into root, stem and leaves
  - 4) Thallus with embryo
11. The plant group in which primitive forms shows complex sexual reproductive process & advanced forms show simple sexual reproductive process is
  - 1) Algae                              2) Fungi
  - 3) Bryophytes                        4) Spermatophytes
12. In most fungi, mycelial wall is made up of
  - 1) Chitin    2) Cellulose    3) Lignin    4) Cutin
13. All fungi are always
  - 1) Autotrophs                        2) Heterotrophs
  - 3) Saprophytes                       4) Parasites
14. All heterotrophs require an environment which can provide
  - 1) Nitrates in Solution    2) Organic compounds
  - 3) Ammonium salts        4) Vitamin-A
15. Fungi differ from algae in being
  - 1) Heterotrophic                  2) Autotrophic
  - 3) Parasitic                        4) Epiphytic
16. In the heterotrophic thallophytes, the reserve carbohydrate is found in the form of
  - 1) Starch                              2) Hemicellulose
  - 3) Cellulose                         4) Glycogen
17. Fungi differ from Algae in having
  - 1) Cell wall made up of cellulose
  - 2) Cell wall made up of chitin and cellulose
  - 3) Chlorophyll    4) Starch as reserve food material
18. In haplontic life cycle, diploid number is restricted to
  - 1) Male plant                        2) Female plant
  - 3) Zygote                              4) Prothallus
19. Highly evolved gametophyte is present among
  - 1) Algae                                2) Fungi
  - 3) Bryophytes                        4) Pteridophytes
20. The Atracheate, Embryophytic plants are
  - 1) Thallophytes                      2) Bryophytes
  - 3) Pteridophytes                      4) Angiosperms
21. Bryophytes are
  - 1) Homosporous plants
  - 2) Heterosporous plants
  - 3) Homosporous and heterosporous
  - 4) Asporous plant
22. Bryophyta cannot be included under
  - 1) Archegoniatae                    2) Embryophyta
  - 3) Trachaeophyta                    4) Cryptogamae
23. The first group of plants to have heteromorphic alternation of generations is
  - 1) Thallophytes                      2) Bryophytes
  - 3) Pteridophytes                      4) Spermatophytes
24. The first group of terrestrial plants are
  - 1) Thallophytes                      2) Bryophytes
  - 3) Pteridophytes                      4) Spermatophytes
25. The sex organs in Bryophytes are
  - 1) Unicellular    2) Multicellular without sterile jacket
  - 3) Multicellular with sterile jacket    4) Absent
26. The first division of plants to have archegonium as the female sex organ is
  - 1) Algae                                2) Fungi
  - 3) Bryophyta                        4) Pteridophyta
27. The most primitive vascular plants are
  - 1) Cycads                              2) Ferns
  - 3) Mosses                              4) Brown algae

28. The only plant group in which sexual phase and asexual phases occur as two individual and separate plants is  
 1) Thallophyta                      2) Bryophyta  
 3) Pteridophyta                    4) Spermatophyta
29. Vascular cryptogams are  
 1) Gymnosperms                    2) Fungi  
 3) Bryophytes                      4) Pteridophytes
30. Spore bearing leaf is called  
 1) Ramenta                        2) Indusium  
 3) Sorus                            4) Sporophyll
31. In Pteridophytes, reduction division occurs when  
 1) Spores are formed    2) Gametes are formed  
 3) Prothallus is formed    4) Sex organs are formed
32. Bryophytes differ from Pteridophytes in the absence of  
 1) Multicellular sex organs  
 2) Ciliated spermatozooids  
 3) Alternation of generation    4) Vascular tissues
33. Heterosporous pteridophytes always produce  
 1) Monoecious gametophytes  
 2) Dioecious gametophytes  
 3) Homothallic gametophytes  
 4) Heterothallic gametophytes
34. The generation which begins with the formation of zygote and ends with the formation of spores is  
 1) Gametophyte                    2) Sporophyte  
 3) Vegetative phase            4) Sexual phase
35. Pteridophytes resemble the higher plants in having complex organization in  
 1) Gametophyte    2) Sporophyte    3) Sex organs  
 4) The methods of vegetative reproduction
36. The method of fertilization is Siphonogamy in  
 1) Thallophytes                    2) Bryophytes  
 3) Pteridophytes                    4) Spermatophytes
37. Plants producing naked seeds belong to the following class  
 1) Angiosperms                    2) Cryptogams  
 3) Gymnosperms                    4) Thallophytes.
38. Heterospory is found in  
 1) All Pteridophytes                2) Gymnosperms  
 3) Angiosperms  
 4) Gymnosperms and Angiosperms
39. Megasporeangium first appeared in  
 1) Bryophyta                        2) Pteridophyta  
 3) Gymnosperms                    4) Angiosperms
40. Fruits are absent in  
 1) Monocotyledons                2) Dicotyledons  
 3) Angiosperms                    4) Gymnosperms
41. Mega sporangium of Gymnosperms contains  
 1) Antipodals                      2) Synergids  
 3) Egg cell                        4) Dikaryotic cell
42. A common character shared by Pteridophytes and Gymnosperms is the presence of  
 1) Ovules    2) Tracheids    3) Fruits    4) Aplanogametes
43. The endosperm in Gymnosperms is always  
 1) Haploid    2) Diploid    3) Triploid    4) Tetraploid
44. The flowers in Gymnosperms do not possess  
 1) Microsporophylls                2) Megasporophyll  
 3) Perianth                        4) Axis
45. A megasporangium is called ovule when it is having  
 1) Nucellus                        2) Megaspore mother cell  
 3) Integuments                    4) Funicle
46. The first group of plants to have integumented ovules  
 1) Pteridophytes                    2) Gymnosperms  
 3) Dicots                        4) Monocots
47. Bryophytes, Pteridophytes and Gymnosperms can be included under  
 1) Cryptogamae                    2) Archegoniatae  
 3) Tracheophyta                    4) Spermatophyta
48. The dominant flora on land is  
 1) Algae                        2) Bryophytes  
 3) Gymnosperms                    4) Angiosperms
49. Gymnosperms differ from Angiosperms  
 1) In having seeds                2) In being smaller  
 3) In having naked ovules  
 4) In having vascular tissue
50. Sporophytic generation in the life cycle of a plant originates from  
 1) Spore    2) Spermatozoid    3) Zygote    4) Egg

**LEVEL-II**

51. Choose the **incorrect** statement:  
 1) Some fungi grow in symbiotic association with algae.  
 2) In fungi, cells are prokaryotic with plastids.  
 3) In fungi reserve food material is glycogen/oil globules.  
 4) Lichens are symbiotic
52. Which of the following statement is **correct**  
 1) All fungi are autotrophs  
 2) Some fungi are autotrophs  
 3) There are fungi which are saprophytes  
 4) Some fungi have chloroplasts.
53. Read the following statements and choose the **correct** one  
 1) Both thallophytes and bryophytes are non-embryophytes  
 2) Heterotrophic thallophytes lack sexuality  
 3) Most primitive plants of the plant kingdom are tracheophytes  
 4) All kinds of gametic union are present in autotrophic thallophytes

54. In the life history of Bryophytes,
- 1) The dominant phase is gametophyte, but sporophyte is independent
  - 2) The dominant phase is gametophyte, and the sporophyte is a complete or partial parasite on the gametophyte
  - 3) The dominant phase is sporophyte, but the gametophyte is independent
  - 4) The dominant phase is sporophyte and the gametophyte is very much reduced and totally parasitic on the sporophyte
55. Which of the following statement is **correct** for plant-producing spores by a diploid sporophyte and gametes by a haploid gametophyte?
- 1) The sporophyte produces the zygote directly.
  - 2) The zygote develops into a gametophyte directly.
  - 3) The gametes are produced by meiosis.
  - 4) The spore develops into a gametophyte directly.
56. Pick the **wrong** statements regarding Pteridophytes
- 1) Presence of vascular tissue
  - 2) Presence of sessile male and female gametangia on prothallus
  - 3) Presence of independent sporophyte and gametophyte
  - 4) Water is not necessary at the time of fertilization
57. Pteridophytes have these special features as compared to bryophytes
- 1) Motile male gametes
  - 2) Archegonium
  - 3) Heteromorphic alternation of generations
  - 4) Dominant sporophytic stage
58. Pteridophytes differ from the other cryptogams in having
- 1) Independent gametophytes
  - 2) Independent sporophytes
  - 3) Dependent gametophytes
  - 4) Dependent sporophytes
59. The sporophytes produce spores but not seeds in
- 1) Bryophytes and pteridophytes
  - 2) Pteridophytes and gymnosperms
  - 3) Gymnosperms and angiosperms
  - 4) Angiosperms and bryophytes
60. Select the **correct** ascending order of the sexual reproduction in plants on the basis of evolution
- 1) Siphonogamy-Zooidogamy-Isogamy-Anisogamy
  - 2) Isogamy-Anisogamy-Siphonogamy-Zooidogamy
  - 3) Isogamy-Anisogamy-Zooidogamy-Siphonogamy
  - 4) Anisogamy-Isogamy-Zooidogamy-Siphonogamy
61. Pteridophytes can be included under
- i) Embryophyta
  - ii) Tracheophyta
  - iii) Archegoniate
- 1) i and ii only
  - 2) ii and iii only
  - 3) i and iii only
  - 4) i, ii and iii
62. Sporophyte is the dominant generation in the life cycle of
- i) Pteridophytes
  - ii) Gymnosperms
  - iii) Angiosperms
- 1) i and ii only
  - 2) ii and iii only
  - 3) iii and i only
  - 4) i, ii, and iii
63. Choose the **incorrect** statement from the following:
- 1) Life cycle is haplo-diplontic in Bryophytes
  - 2) Life cycle is diplo-haplontic in *Mangifera*
  - 3) Life cycle is haplo-diplontic in *Rhizopus*
  - 4) Life cycle is haplontic in *Spirogyra*
- Note: For all Assertion (A) and Reason (R) Questions, identify the correct answer from the choices given below.**
1. A and R are correct and R is the correct explanation of A
  2. A and R are correct but R is not the correct explanation of A
  3. A is true but R is false
  4. A is false but R is true
64. Assertion (A) : In Thallophyta, gametangia are usually with-jackets.  
Reason (R) : In Thallophyta, the body structure as well as reproductive organs are simple in their structure.
65. Assertion (A) : In Thallophyta, life cycle is haplontic  
Reason (R) : In *Spirogyra* zygote undergoes mitosis
66. Assertion (A) : Bryophytes exhibit heteromorphic alternation of generations.  
Reason (R) : In Bryophytes gametophytic phase is dominant and the sporophyte is dependent on the gametophyte.
67. Assertion (A) : Spore is the first cell of gametophytic generation.  
Reason (R) : Gametophyte develop from spore
68. Assertion (A) : Pteridophytes are the first true land plants  
Reason (R) : In Pteridophytes vascular system is evolved
69. Which of the following character is related to the Pteridophytes?
- I) Siphonogamous type of oogamy
  - II) Presence of simplest plant body
  - III) Direct pollination
  - IV) Presence of integumented megasporangia
  - V) Plant body is gametophyte
  - VI) Sessile sex organs
- 1) I, III and IV
  - 2) II, III and V
  - 3) I, II, III, IV, V and VI
  - 4) VI alone

## UNIT - I :: INTRODUCTION

70. Assertion(A): Endosperm in Gymnosperms is haploid  
Reason (R): In Gymnosperms, endosperm is a female gametophyte formed before fertilization
71. Assertion (A): Gymnosperms are known as naked seeded spermatophytes.  
Reason (R): Carpels are not folded in gymnosperms.
72. All Gymnosperms show  
I) Siphonogamy                      II) Naked seeds  
III) Heterospory                      IV) Zygosporangia  
1) I and III only correct    2) I and II only correct  
3) I, II and III are correct    4) I, III and IV are correct
73. Assertion (A): Tracheids are the main water conducting elements in Pteridophytes and Gymnosperms  
Reason (R): Tracheids are absent in Angiosperms.
74. Assertion (A) : In angiosperms double fertilization is a common phenomenon.  
Reason(R): In Dicots syngamy results in diploid zygote
75. Assertion (A): Cones of Gymnosperms are equivalent structures to flower of angiosperms  
Reasons (R): In the cones of Gymnosperms, sporophylls are arranged on condensed cone axis
76. Find the **true** combinations of statements  
I. Female gametophyte of angiosperms develop inside the integumented megasporangium  
II. Phanerogams show multicellular fertilized ovule with embryo  
III. Gymnosperms are either herbaceous or woody plants  
IV. Phanerogams with naked seeds show ategmic ovules  
1) I, II & IV    2) I, II    3) I, II, III    4) II, III, IV
77. Arrange the following plant groups in evolutionary sequence  
I) Bryophyta                      II) Pteridophyta  
III) Angiosperms                      IV) Algae  
1) I, II, III, IV                      2) II, III, IV, I  
3) III, IV, I, II                      4) IV, I, II, III
78. Arrange the following plant groups in ascending order with reference to the gradual reduction of gametophytic stage  
I) Bryophyta                      II) Gymnosperms  
III) Angiosperms                      IV) Pteridophyta  
1) I, II, III, IV                      2) I, IV, II, III  
3) I, II, IV, III                      4) IV, II, I, III
79. Arrange the following plant groups in ascending order with reference to the development of vasculature  
I) Gymnosperms                      II) Pteridophyta  
III) Angiosperms                      IV) Bryophytes  
1) I, II, III, IV                      2) II, III, IV, I  
3) III, II, I, IV                      4) IV, II, I, III
80. Match the following and choose the **correct** option
- | List - I        | List-II                |
|-----------------|------------------------|
| A) Gymnosperms  | I) Heterotrophic       |
| B) Fungi        | II) Vascular cryptogam |
| C) Angiosperms  | III) Fruit formation   |
| D) Pteridophyta | IV) Haploid endosperm  |
- | A     | B   | C   | D  |
|-------|-----|-----|----|
| 1) I  | II  | III | IV |
| 2) II | III | IV  | II |
| 3) IV | I   | III | II |
| 4) I  | III | II  | V  |
81. Which of the following combinations are **correct** ?
- | Plant group      | Habitat       | Dominant stage |
|------------------|---------------|----------------|
| I) Algae         | Aquatic       | Sporophyte     |
| II) Fungi        | Heterotrophic | Gametophyte    |
| III) Bryophyta   | Autotrophic   | Sporophyte     |
| IV) Pteridophyta | Autotrophic   | Sporophyte     |
- 1) I and II                                      2) II and IV  
3) I, II and III                                      4) II and IV
82. Which of the two combinations are **correct** ?
- | Plant group      | Part       | Xylem     |
|------------------|------------|-----------|
| I) Bryophyta     | Archegonia | Vessels   |
| II) Pteridophyta | Archegonia | Tracheids |
| III) Gymnosperms | Embryosac  | Tracheids |
| IV) Angiosperms  | Embryosac  | Vessels   |
- 1) I and II                                      2) II and III  
3) III and IV                                      4) II and IV